



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/781,283	02/13/2001	Pei Reng Jeng	MR1035-820	9464
4586	7590	01/16/2004	EXAMINER	
ROSENBERG, KLEIN & LEE 3458 ELLICOTT CENTER DRIVE-SUITE 101 ELLICOTT CITY, MD 21043			ESTRADA, MICHELLE	
			ART UNIT	PAPER NUMBER
			2823	

DATE MAILED: 01/16/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

09/781,283

Applicant(s)

JENG ET AL.

Examiner

Michelle Estrada

Art Unit

2823

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 30 October 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-4 and 9-15 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-4 and 9-15 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. §§ 119 and 120

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some \* c) ☐ None of:  
1. ☐ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
\* See the attached detailed Office action for a list of the certified copies not received.
- 13) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.  
a) ☐ The translation of the foreign language provisional application has been received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

### Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

## DETAILED ACTION

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-4 and 9-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Andideh, Ang et al. and Mei et al. (6,475,895).

Andideh discloses providing a semiconductor substrate already completing the basic process of forming devices 100 such as a field oxide 102, a source, a drain, and a gate thereon (Col. 1, lines 22-24 and Fig. 1d); wherein the gate comprises a tunneling oxide layer, a floating gate, a dielectric layer and a control gate; forming a dielectric layer 103 (BPSG or PSG) used as an inter-layer dielectric on said semiconductor substrate, lapping said dielectric layer by means of a chemical mechanical polishing; and forming an oxide layer 106.

Andideh does not disclose forming a cap layer of high refractive index on said lapped dielectric layer.

Ang et al. disclose semiconductor structure 10 that includes exposed semiconductor devices or interconnect lines 12 which can be comprised of aluminum; forming an ILD 16/18 and chemical-mechanical polishing 18 which can be comprised of FSG or a low K dielectric layer (Col. 3, lines 35-36); and forming a capping layer 20 that

Art Unit: 2823

may be comprised of silicon nitride, silicon oxynitride or silicon-rich oxide (SRO) having a thickness in the range of 500-4000 Å.

It would have been within the scope of one of ordinary skill in the art to combine the teachings of the references to form the capping layer of Ang et al. on the polished inter-layer dielectric of Andideh to enable formation of an ILD as disclosed by Andideh and for the reasons disclosed in Ang et al.

One of ordinary skill in the art would have been led to the recited dielectric (ILD) layer thickness to routine experimentation to achieve a desired device dimension, associated device characteristics and device density of the finished wafer in view of the range of values disclosed. See MPEP 2144.05. In addition, the selection of the dielectric (ILD) layer thickness, its obvious because it is a matter of determining optimum process conditions by routine experimentation with a limited number of species of result effective variables. These claims are prima facie obvious without showing that the claimed ranges achieve unexpected results relative to the prior art range. In re Woodruff, 16 USPQ2d 1935, 1937 (Fed. Cir. 1990). See also In re Huang, 40 USPQ2d 1685, 1688 (Fed. Cir. 1996)(claimed ranges or a result effective variable, which do not overlap the prior art ranges, are unpatentable unless they produce a new and unexpected result which is different in kind and not merely in degree from the results of the prior art). See also In re Boesch, 205 USPQ 215 (CCPA) (discovery of optimum value of result effective variable in known process is ordinarily within skill or art) and In re Aller, 105 USPQ 233 (CCPA 1995) (selection of optimum ranges within prior art general conditions is obvious).

Art Unit: 2823

Note that the specification contains no disclosure of either the critical nature of the claimed dielectric (ILD) layer thickness or any unexpected results arising therefrom. Where patentability is said to be based upon particular chosen dielectric (ILD) layer thickness or upon another variable recited in a claim, the Applicant must show that the chosen dielectric (ILD) layer thickness are critical. In re Woodruff, 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990).

The combination of Andideh and Ang et al. does not specifically disclose that the cap silicon oxynitride layer have a refractive index of at least 1.6, wherein said cap layer is translucent to ultra-violet light., which overlaps with the recited range of claim 1.

Mei et al. disclose forming metal structures (46/48/50) of aluminum, aluminum alloy or copper; forming an insulating layer (52); and forming a silicon oxynitride layer (56) having a refractive index of at least 1.6 and is translucent to UV light (Col. 4, lines 15-17).

It would have been within the scope of one of ordinary skill in the art to combine the teachings of Andideh, Ang et al. and Mei et al. to enable formation of the cap layer, and further silicon oxynitride cap layer has a hard surface to provide physical and mechanical protection for the underlying device.

The examiner takes official notice that the use of polysilicon material in floating gates and control gates was known at the time of the applicant's invention. It would have been within the scope of one of ordinary skill in the art to use the known material

Art Unit: 2823

for its known intended purpose to achieve the formation of the floating and control gates of the combination.

The examiner takes official notice that the use of PECVD silicon oxide layer and tetraethyl-orthosilicate layer to form an inter-metal dielectric was known at the time of the applicant's invention. It would have been within the scope of one of ordinary skill in the art to use the known layers for its known intended purpose to achieve the formation of the inter-metal dielectric layer of the combination.

### ***Response to Arguments***

In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

Applicant argues that none of the references relied upon by the Examiner disclose the problem solved by the invention of the subject Patent Application, and thus their combination cannot be said to form the solution for such a problem. However, the references do not need to disclose the same advantages as the instant application, it is sufficient that the same materials are treated in the same manner. See MPEP 2144.

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP

Art Unit: 2823

§ 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michelle Estrada whose telephone number is (703) 308-0729. The examiner can normally be reached on Monday through Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Olik Chaudhuri can be reached on 703-306-2794. The fax phone numbers for the organization where this application or proceeding is assigned are 703-308-7722 for regular communications and 703-308-7724 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.



MEstrada  
December 30, 2003



George Fourson  
Primary Examiner  
Art Unit 2823